

## **Rapid scavenging of $^{234}\text{Th}$ and particulate organic matter in the continental shelf water of the Yellow Sea and East China Sea**

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Thorium-234 ( $^{234}\text{Th}$ ; half life = 24.1 days) has been used as an excellent tracer of element scavenging, particle settling, and the export of particulate organic carbon (POC) in the ocean. We measured the vertical and horizontal distributions of dissolved, particulate, and total phases of  $^{234}\text{Th}$ , POC, and other oceanographic parameters in the continental shelf (~ 80 m depth) of the Yellow Sea and the East China Sea in summer. Changjiang Diluted Water (CDW) with the salinity range from 26 to 31 was present with higher POC and chlorophyll-a contents; in the surface layer. Interestingly,  $^{234}\text{Th}$  activities were extremely low compared to the values observed in the open ocean. The disequilibrium of dissolved and total  $^{234}\text{Th}$  relative to its parent  $^{238}\text{U}$  were highest in the CDW stations, with short residence times  $^{234}\text{Th}$  for the upper 50 m being shorter than 10 days. We propose rapid settling of particles in this shelf region, especially in CDW-affected stations. POC export flux to the seafloor estimated using  $^{234}\text{Th}$  was  $60\pm 50 \text{ mmol m}^{-2} \text{ d}^{-1}$ , which is an order of magnitude higher than that in the sediment column. The rapid scavenging of particulate organic matter (POM) implies effective degradation of POM to inorganic or dissolved species in the benthic boundary layer.